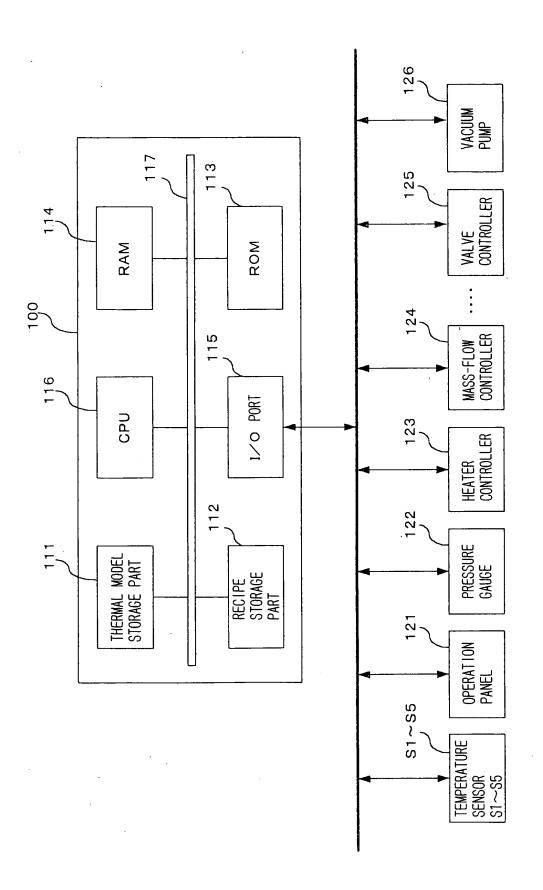


FIG. I



F16.2

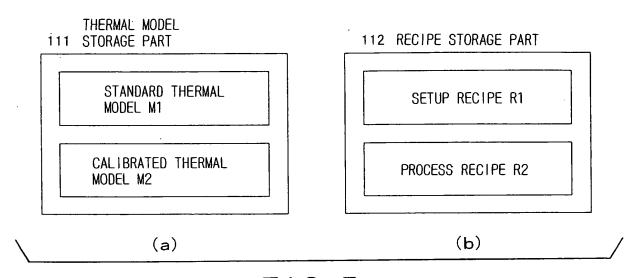


FIG. 3

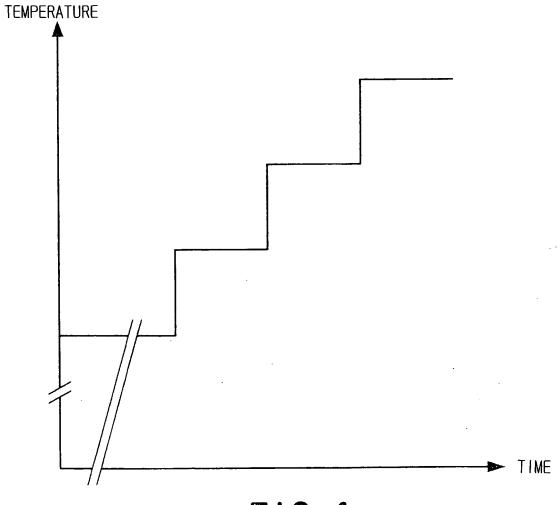
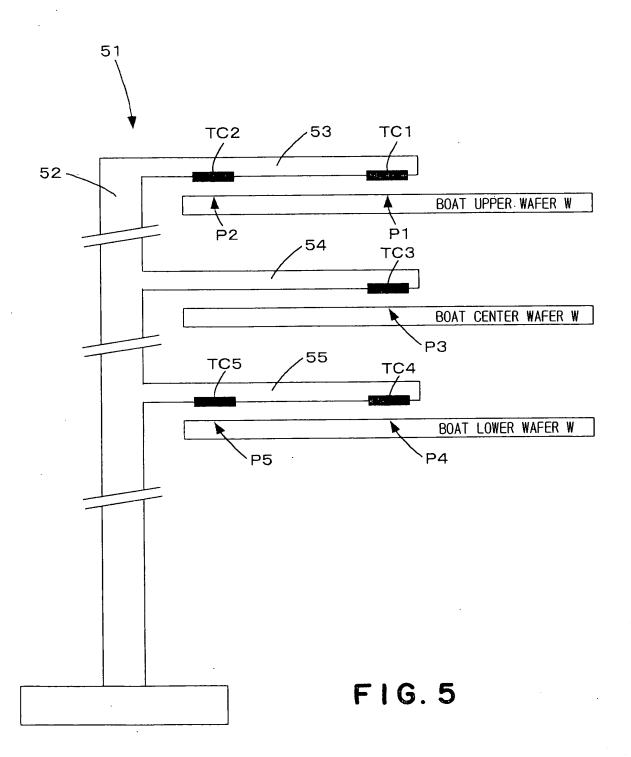


FIG. 4



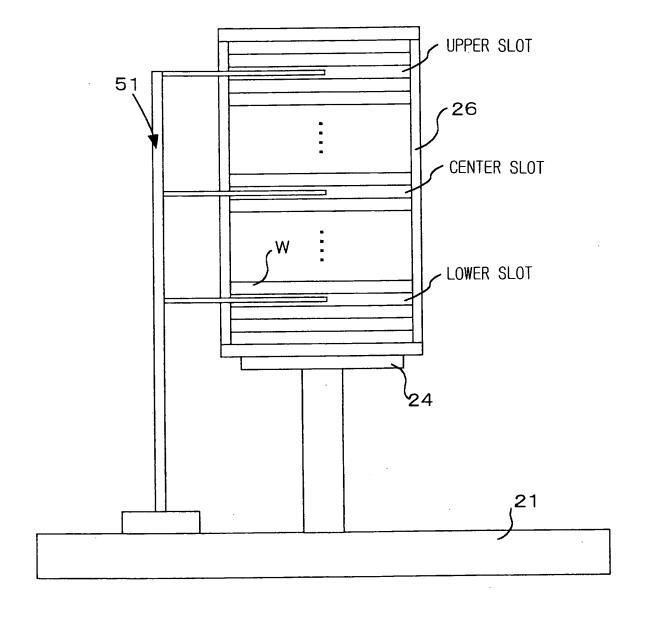


FIG. 6

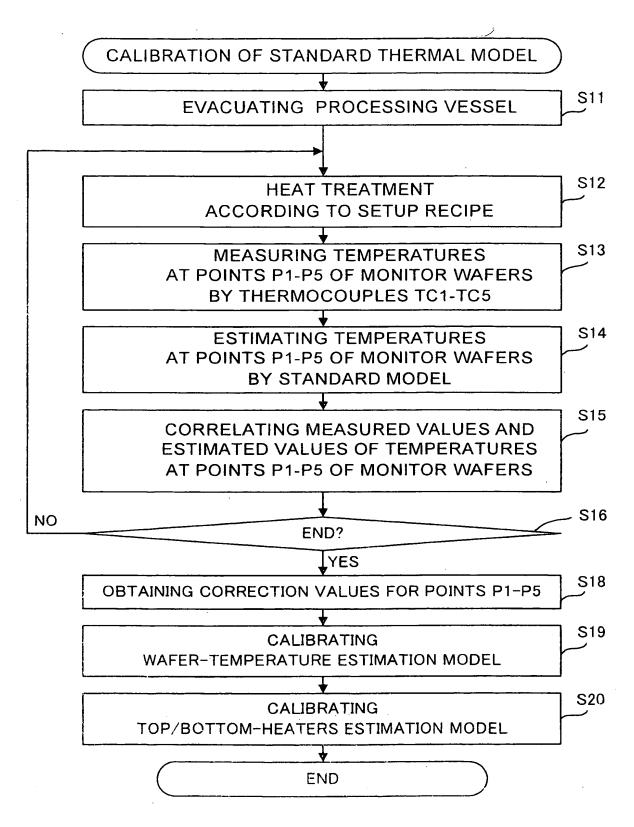


FIG. 7

CALIBRATION OF TOP/BOTTOM-HEATER TEMPERATURE ESTIMATION MODEL

OBTAINING ESTIMATED VALUES AND MEASURED VALUES OF TEMPERATURE SENSORS S4 AND S5 UNDER STABILIZED PRESET TEMPERATURE

CALCULATING CORRECTION VALUES (MEASURED VALUE MINUS ESTIMATED VALUE) FOR TEMPERATURES

1. DERIVING MATRIX *Kt* EXPRESSING CORRELATION BETWEEN CHANGE IN SURFACE TEMPERATURE ΔTt OF TOP HEATER AND CHANGE IN TEMPERATURES ΔTs1 – ΔTs5 OF SENSORS S1 –S5 ΔTt = *Kt* · [ΔTs1, ΔTs2, ΔTs3, ΔTs4, ΔTs5]

2. DERIVING MATRIX Kb EXPRESSING CORRELATION BETWEEN CHANGE IN SURFACE TEMPERATURE Δ Tb OF BOTTOM HEATER AND CHANGE IN TEMPERATURES Δ Ts1 $-\Delta$ Ts5 OF SENSORS S1 -S5 Δ Tb = Kb - [Δ Ts1, Δ Ts2, Δ Ts3, Δ Ts4, Δ Ts5]

- 1. TEMPERATURE OF TOP HEATER =
 [ESTIMATED TEMPERATURE ESTIMATED BY STANDARD THERMAL MODEL]
- + Kt · [0, 0, 0, (ESTIMATED TEMPERATURE MINUS MEASURED TEMPERATURE OF TEMPERATURE SENSOR S4), 0]
- 2. TEMPERATURE OF BOTTOM HEATER = [ESTIMATED TEMPERATURE ESTIMATED BY STANDARD THERMAL MODEL]
- + **Kb** · [0, 0, 0, 0, (ESTIMATED TEMPERATURE MINUS MEASURED TEMPERATURE OF TEMPERATURE SENSOR S4)]

STORING CALIBRATED THERMAL MODEL IN THERMAL MODEL STORAGE PART

RETURN

FIG. 8

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ESTIMATED TEMPERATURE	ТР5	500°C	2,009	:	100°C
	ТР4	500°C	2,009		1090°C 1070°C 1086°C 1090°C 1100°C 1100°C 1100°C 1100°C 1100°C
	ТРЗ	2009	2,009 2,009	•	1100%
	TP2	2,009			1100°C
	TP1	೨,009	೨。೦೦9	:	1100°C
MEASURED TEMPERATURE	TC5	480°C	282,0	:	1080°C
	TC4	490°C	2,069	:	1090°C
	тсз	480°C 490°C	570°C 590°C	:	1086°C
	TC2	480°C	570°C	:	1070°C
	TC1	490°C	587°C	:	1090°C
PRESET (TARGET)		500°C	2,009		1100°C

F16.9

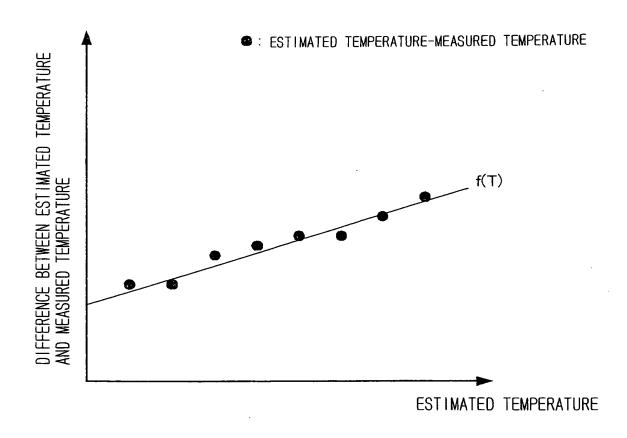


FIG. 10